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L.T. CARRUTHERS

EINO MORTTI

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EBEN CARRUTHER

CUB NIEMI

DICK

PLUG NELSON

E. W. TALLANT

MY DAYS AT BIOPRODUCTS

Lyle Anderson

Warrenton OR 1979

ABSTRACT

Bioproducts is a small company with 35 or 40 employes on the Oregon Coast; it started on a shoestring in the Great Depression. It has been characterized by a fierce will to survive, having lost its major product 9 times and turned up with a replacement idea that was better each time. Sales have grown from \$37,000 to over \$4 million. Starting with only fish as raw material, fish is still contained in several products. The company currently is an important factor in the petfood and fish hatchery food industries. For years, nothing on the market has beaten or even equalled Bioproducts flavors for appeal.

PREFACE

Since people seem generally to have an innate curiosity of their origins, it follows that something should be written to cover at least part of Bioproduct's history. However a difficulty arises that hearkens back to the story of The Blind Man and the Elephant. The near-blind man in this case is a chemist with myopic vision whose universe ~~revolves~~ ^{revolves} around ~~him~~ his laboratory. So if you have a weak stomach, or sensitive ears, please read no further! This is not a critique. It is Pollyanna at her horn-blowing finest!

STARTING FROM SCRATCH

Dick Carruthers had attended the U. of O. for 3 years, majoring in architecture. His brother, Eben, also went to college and graduated in mechanical engineering. Both boys were independent thinkers, unusually creative, and unusually versatile. They both were accomplished artists and Eben an accomplished musician and inventor. An aura of creativity pervaded their

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presences. This probably was due to the stimulating and challenging trend of their conversations and thoughts. They each had the gift of making the right judgements in business ventures.

Many people have been able to start a business, and many people have been able to operate a going business. But few have started a business from scratch and kept it going -- especially a primary industrial business.

Dick and Eben had raised college money by packing salmon eggs for sports fishermen. I never knew, nor wanted to, what their process was but it involved sugar, maybe alum, maybe formaldehyde, and red dye. They specialized in large "Jumbo" eggs and "Clusters". Their product resembled a maraschino cherry in texture and color. Beyond any doubt salmon eggs, under the name Salmon By-products, was the start of things for two college boys.

However this was also the first of a long line of products to bow down to changing times. With each dam on the Columbia, the salmon run declined a notch and concomitantly fish hatcheries and delicatessens each took their bites.

Eben went East and became professor of Mechanical Engineering at Cornell. Dick was born in Florida but always stuck around Astoria. I think his father was in retail hardware and his mother's Tallant family was deep in the Tallant-Grant salmon cannery. There is a Carruthers building in Astoria at 12th and Commercial where the Owl Drug Store is located.

Somewhat prior to the setting of our story, vitamin A had been discovered and had been found to be present in marine fish livers. There are several forms of Vitamin A. Vitamin A is a carotenoid that performs some necessary functions in maintaining health in much of the animal kingdom so it is not surprising that a group of physicians embraced the idea of obtaining Vitamin A from salmon livers. Abbott Laboratories had early-on recovered Vitamin A from halibut livers. I do not know who sired the idea of getting Vitamin A

from salmon livers.

Dr. Ulysses Moore of Tacoma was the physician most interested in getting rid of some of his money, and a corporation called Saliver, Inc. was formed. A loan was obtained from Franklin D. Roosevelt's Reconstruction Finance Corporation as a Great Depression fighter. A building that had been moved off the Port Docks property in Astoria was obtained for a plant. It originally was one-story and about 60 or 75 feet square but Dick raised it up to make it two-story. It is located just across the tracks at the entrance to pier 1 on the downriver side of the entrance street to pier 1. It is a beer warehouse currently. Dick became manager of Saliver.

In college, Dick had roomed with John Trullinger (John pronounced it True'-ling-er) John had partly financed his time in college by playing piano "by ear" in dance bands. One of John's ancestors (grandfather?) had set up a steam-electric generator at the side of his sawmill. This was in "Union town" of Astoria on the Douglas Service Station property. This sawdust-fired boiler provided power for lights for some houses and some city street lights. There is a monument there to mark the place. People seemed to like electric lights, for some strange reason, so the enterprise was expanded to form the company now called Pacific Power and Light. A larger sawdust-fired plant was then built down past KAST. It is still there and I think it is still operable. John had learned bookkeeping and had worked in the offices of canneries doing that work so it was natural for Dick to team up with his old roommate when things were brewing.

Now another technological development had also occurred in the early 1930's. This was salmon canning oil.

both of the USBF Montlake lab, Roger Harrison and his associate, Andrew Anderson, had "dreamed-up" (Roger's words) the idea of recovering an edible oil from salmon cannery table scrap. This oil was to be added back to the salmon steaks as they were canned, thereby enhancing the grade of the pack. The salmon heads provided most of this oil

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and the eggs provided most of the color in the oil.

As steaks are cut from a Chinook salmon, as for canning, the steaks near the collar will contain much more oil than those from the Caudal Peduncle, or tail if you like that better. This is because the oily muscles on the two lateral lines, and those on the back and belly, taper out and virtually disappear toward the tail. Adding oil to all cans insures that every can will at least contain some oil. This makes a more uniform pack. Six ml. of oil were added to a Columbia River half flat, salt on the bottom, then fish, then oil. The actual amount of oil added to the entire pack was not large, however. It has not been economically practical to oil the lower grade packs, only the higher grade packs; and the same was true of skinning as done by P.A.F. later.

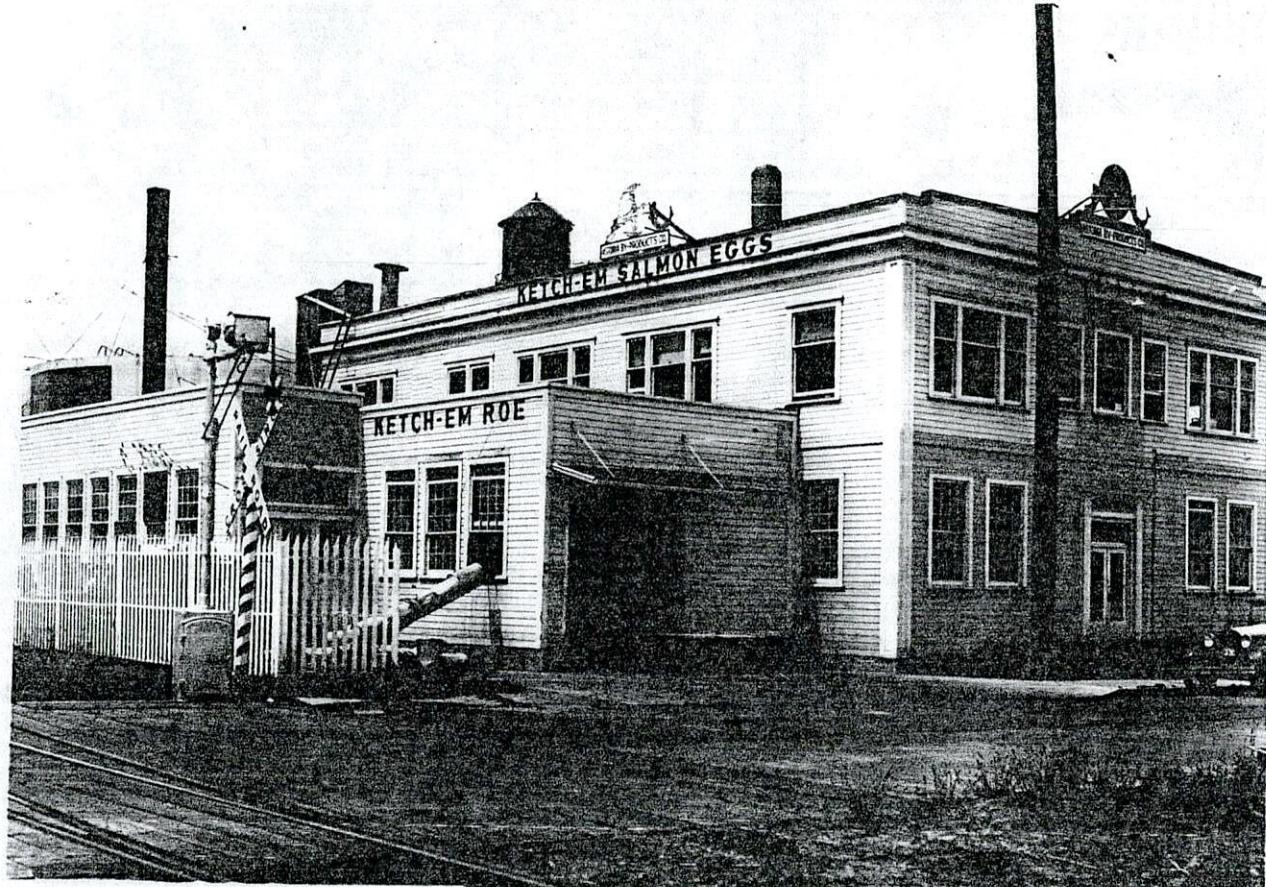
In order to try out this idea on a pilot plant scale the two men had gone to Astoria about 1932 seeking facilities and receptive people. The Columbia River Packers Association, C.R.P.A., was the first to put in an "oil room" and in 1933 they hired a classmate of mine, Harold Heaton, to make their oil. The next cannery to oil was Barbey Packing Co. (which had moved from near the site of the ^{present} plant of BioProducts, namely the GN docks at Flavel, to Pier 1, Port Docks). Dick Carruthers ran Barbey's oil room about 1934.

Saliver, Inc. had the money and employment potential to qualify for an R.F.C. loan. And it must have taken money to buy the building, move it, and raise it, buy and install a 2nd hand 50 h.p. boiler (with some tubes plugged off and a steam water-injector); plus two jacketed batch meal driers; plus a meal ~~swing~~-sledge hammer mill fed by hand, and off-bourne by hand, and shovel sacked; plus a raw fish worm and plate grinder; plus two centrifuges; plus a truck; plus miscellaneous office and plant equipment.

There was a 1931 Chevy panel, with the name Astoria Fisheries Laboratories painted on the door, that was used to pick up salmon cannery table scrap. I don't know anything about that name.



100 LBS. NET
BIO-VITA
Life  *Health*
SALMON MEAL
for **FOX and MINK**
PROCESSED FISH SELECTED FOR THE HIGHEST QUALITY AND
CONTAINS NO ADDED COLORANT OR PRESERVATIVE
100% NATURAL
BIO PRODUCTS
INCORPORATED 1947



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So Saliver had revenue from canning oil and fish meal sales. But it never got a penny from Vitamin A because neither A nor oil is present in salmon livers in large enough amounts to be significant. For a meaningful discussion we would have to talk species but, vaguely, let's say 2% oil at a couple of thousand A. Halibut runs around 14% oil at maybe 40,000 to 80,000 A/gm and its double-tough to recover even halibut liver oil -- when you dont know how. And they didn't.

So Saliver hired a chemist, Lacey Evans -- maybe Dr. Evans --, to help with their problems. There is a picture of Lacey and Dick in a monthly issue of Pacific Fisherman, maybe about 1936. I never could find out what Lacey did. In fact John and Dick said he worked forever in the lab but they never knew what he was doing and he never came up with anything for Bioproducts. Next, Charley Barr, a medical student, was hired to hold down the lab. He had run the C.R.P.A. oil room as a premed student. Charlie wrote a minor treatise entitled "The Principal Histology of the Salmon" and then went back to medical school. He seemed to have been a personable chap.

By now the Tacoma physicians were disillusioned about getting Vitamin A from salmon livers. And the R.F.C. was disillusioned about getting any money back on the loan. This made twice as many unhappy parties as is needed for a parting of the ways. And, they parted.

Dick and John had plenty of heart and plenty of hope yet, but they didn't have money in the bank -- which was probably good since some of the banks in Astoria had failed. Further, they both had families of the age that always needs money. Neither had a car. Bioproducts had one -- if you are charitable enough to call it that.

But Dick's mother, Louise Tallant Carruthers brought her check book to the rescue. I think she gave a \$5000 transfusion to the gasping business.

They re-incorporated as Bioproducts, Inc. and took over the R.F.C. loan.

Dick was president, Mrs. L.T. Carruthers was Vice-president, and John was secretary-treasurer. I think the \$5000 went to the R.F.C. and it was now a day to day struggle between revenue and payroll for a long time to come -- with R.F.C. loan payments tossed in as an added handicap.

The canneries, I think, didn't charge for their salmon scrap but they were supposed to be pro-rated on the volume of oil returned. I think the initial price for oil was \$1.00 per gallon but I remember it then being \$2.00 and then \$2.50. The phone would ring and a cannery would say their packer just arrived with fish so they had to have some oil NOW. So a drum, full or not, of hot oil would be yanked off the centrifuge, rolled up some planks to a truck, and dispatched post haste. There were six salmon canneries on the lower River at that time, namely, big C.R.P.A., Barbey, Pt. Adams, Arthur Anderson, McGowen (Washington side) and Union Coop. The first three had oil rooms early.

So thru the spring and summer Bioproducts recovered edible oil from salmon cannery table scrap, turning the press-cake into fish meal for poultry feed. In the fall salmon eggs were packed for bait with a skeleton crew ^{partly} ~~partly~~ made up of the families of Dick and John. There was not year-around employment.

In 1936 I think the fish-house non-skilled labor pay scale was 33 1/3¢ per hour on a 48 hour week. By 1937 I think it was 42 1/2¢/hour. Maybe I should say that I am told those figures rather than I explicitly remember them. I think the 48 hour week held thru WWII and the 44 hour week until the early 50's. Bioproducts always paid the cannery wage scale altho Bioproducts wasn't unionized until 1937. Early-on Bioproducts was in the employers combine called the Columbia River Seafood Packers Association, I think. I remember a ~~picket~~ line once about 1960, but Jean Nordmark, the union secretary, says that there was one about 1975 and one about 1972. She says that there was an employers lockout ^{once in} the the later years too. Bargaining in the hey day of salmon was just before the choice May-June pack, but when that date was maintained into a period of declining salmon runs it left the union in a situation of demanding a wage increase when there wasn't much work anyhow.



Lyle Anderson
Robert Holmes
Trinette Nicholson
Julian Faillleur
John Tru-Linger
R. T. Carruthers

Harold Carrington
Phil Boise
Hiram Hibert
George Duncan
Alvin Johnson
Orvo Piippo
Ellis Jaakala

Bert Pohl
John Latvala
Jim Smith
Ken Murdock
Ernest Hill
Fleming Wilson
Earl Boise

1939 Or 40

So the union is now divided into several divisions. The crew at Bioproducts elected their own plant Shop Steward and a Grievance Committee.

The Union at present is Amalgamated Meat Cutters and Butchers but before that it was United Packing House Workers.

Also at present, Bioproducts management does not bargain in an employers group and Bioproducts' labor is in a separate division of meat cutters from the Astoria fish houses.

Chronologically, I came onto the scene in 1937. I was a graduate student at the U of W, had my masters, had completed my course work and exams for a PhD., was working on my thesis, and had a research fellowship to eat on. The fellowship work was at the Mountlake lab under Roger Harrison and was to determine if the antioxidants naturally present in oat flour were effective in stabilizing Vitamin A in halibut livers aboard vessel. It wasn't front-burner stuff but the work was published in I and E Chem. It was a sketchy introduction to fishery problems but I kept up the acquaintance for over 40 years.

Dick and Roger hit it off quite well and Dick told Roger he needed a chemist for the summer. Roger said Dick was "sort of a dreamer" and he thought that I'd like to work there; that his current problems involved canning-oil.

Astoria has always had miserable connections to Seattle but I finally got there and called the plant. John came to the depot in a rattle-trap jalopy and picked me up. I roomed at Dick's mother's house on Jerome that summer. Dick's house was just behind his mother's and I think he built it.

That summer I worked on salmon oil because Bioproducts received the most revenue from that product at \$2.00 a gallon. The other sizeable product was salmon meal made with a ^Plarge-steam screw-flight cooker and a worm-press.

There is a profound difference in the way the flesh of different fishes cooks and presses. Salmon flesh is unusual in that it is an anadromous fish and is undergoing profound changes as the fish sexually matures and also goes

8 from salt water to fresh water - fasting en route. Salmon is one of the few fishes that can be canned raw. Most other fishes must be pre-cooked. Herring, pitchard, and sardines are very easy to press but it is very difficult to get salmon to form a good press cake. This results in an oily meal -- like often 20% oil, or higher--when running silvers or chinook (but not dogs or humpies). If the oil goes into the meal, it can't be sold for oil and it down-grades the meal in more ways than one. Sometimes no presscake at all would ~~be~~ form and the press would run like it had diarrhea for extended periods of time. Then neither meal nor oil was recovered and everything went down the sewer to the Columbia, including steam, labor, and profit.

To help get a better press, Bioproducts was adding formaldehyde and rock salt at the raw fish grinder. All raw fish was ground and pumped to the cooker. Formaldehyde is a (water soluble) gas so it steam-distilled off as the press cake spent 10 or 12 hours in the drier or as the oil emerged as a fog from the centrifuge. The salt gave a nice "bright" oil, but it lost some oil and also increased protein solubility.

The reason the oil was bright was because sodium salts tend toward emulsions that have water as the continuous phase so the bright oil was obtained at the cost of losing some oil in the discharge water. At that time the "solubles" idea hadn't been hatched yet. So I worked on oil recovery and oily meal a while.

Then attention was turned to quality of salmon oil rather than quantity. Three ^{kind} of experimental oil were made: 1) Good, or oil substantially below $\frac{1}{2}\%$ free fatty acid; 2) Putrid, or oil from 3-day-old fish; and 3) Rancid, or good oil containing copper filling, and also thru which air was bubbled for an hour. A half case of salmon was packed at Union Fish using each of these three oils. When a can of each was cut the next day, the Rancid oil was scarcely noticeable but the Putrid oil would nauseate a veteran. No one volunteered to follow-up on these tasting tests so I

took them up to the University with me when the season was over. As the winter wore on, I found that I would rather open a ^{1/2} half flat of "good" salmon and eat it with a couple of slices of bread than walk a ^{1/2} half mile from the Ocean Labs to a restaurant in Seattle rain. When the ^{1/2} good ran out, I turned next to the Rancid cans because: 6 c.c. of oil wasn't much and I'd just pour that off! It wasn't that way now. The Rancid oil cans were too vile to eat whereas at an earlier time they seemed to be edible. As for the Putrid oil cans, they were now usable whereas they formerly were not. And I ate them. Maybe my standards lowered as my bank roll lowered. I often thought that the "putrid" smell must be due to dissolved amines in the oil since the smell is not like a fatty acid at all. However none of the simple amines give that smell and I could never get a Kjeldahl nitrogen reading on ⁺⁺⁺ any oil.

Dick wanted me to write up the various projects that I had worked on that first year, before I left Astoria. He said to not hesitate to abbreviate my words because the office girl had little to do all winter long and could easily get it typed. Dick set up the format for the "Bioproducts Technical Reports and the girl, Louise or was it Trin? got them typed but it wasn't easy. Later, when I abbreviated the words to Biop. Tech. Report in my manuscript, Trin followed the spelling with high fidelity and the name struck for almost 40 years.

When I left in the fall of 37, Dick and John each, separately, told me that they wanted me to come back the next year.

In 1937 I was paid \$100 a month but when I returned in 1938, Dick told me that they were raising my salary to \$125 a month. However it would be divided: I would receive \$75 as "cash", \$50 per month as stock in Bioproducts, and would become vice-president. The \$75 a month was really a warrant because Bioproducts was always behind on all payrolls. If I went to John on Saturday and asked if I could have a check he'd say "Oh sure, Lyle, Uh, let's see, \$5 will get you by for the weekend, won't it?" Then if I'd ask if that could

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be made 10, he'd make a wry face, wrinkle up his nose, pause a long time, and say "well, all right."

As an officer, I now received last years Balance Sheet. The ~~sales~~ in 1937 were \$37,000. The wolves were always at the door. We worked a six day week but one Saturday Dick asked if I'd come down on Sunday to help with a car of meal, and this I did.

A box car had been spotted on a team track and Bioproducts' truck was backed as far into the plant as possible. Dick, John, and I lifted the 100# sacks of salmon meal onto the truck, drove to the team track, off-loaded by hand to the car, and walked the length of the car with each sack for stowage. The truck had a low bed and was much below car level. And the car location was bad. I'm sure their wives had a full night's sleep that night. It wouldn't be correct to say I was tired -- I was just plain pooped.

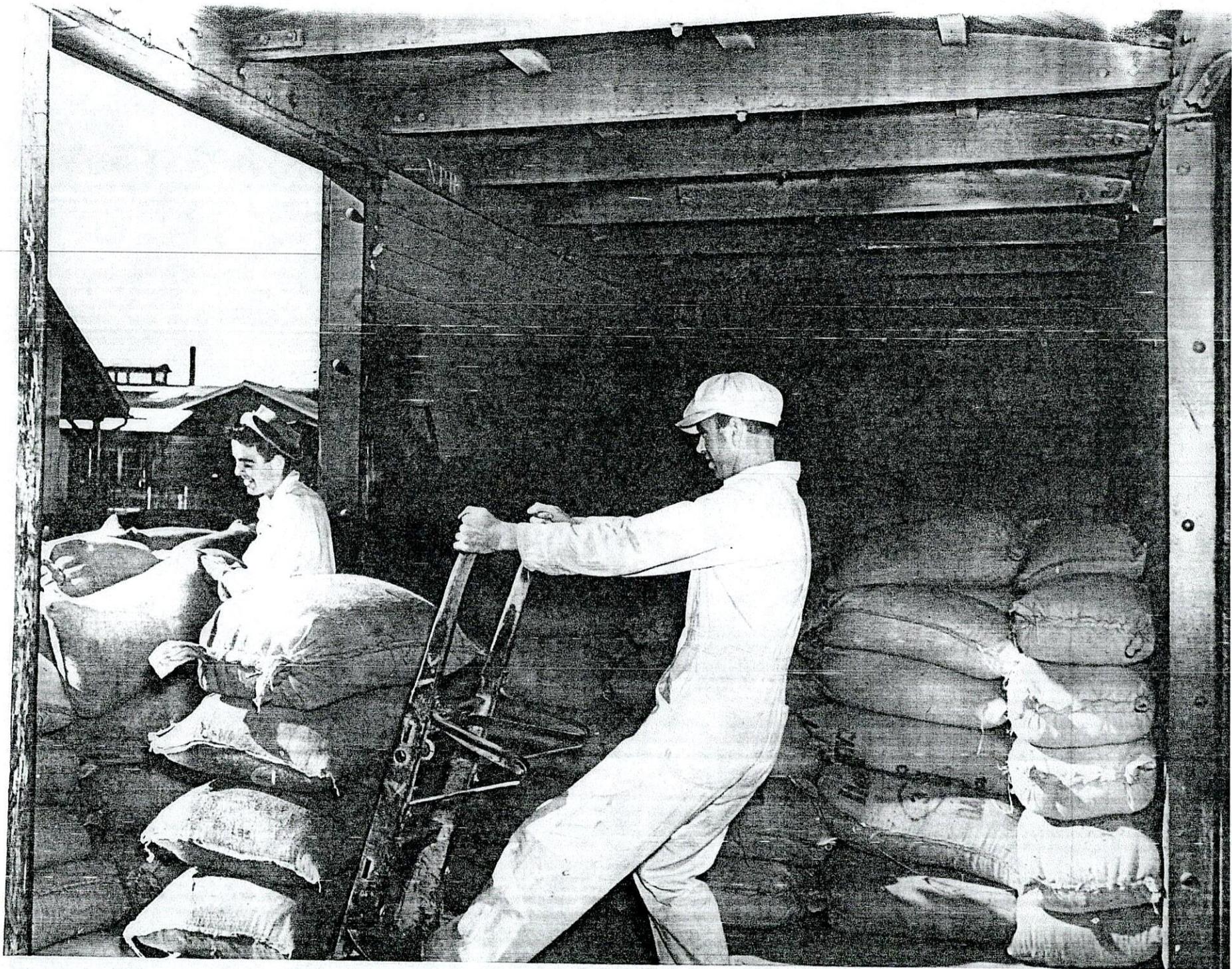
I think albacore were discovered off the Oregon Coast in 1938. The hubub was like a gold rush. The canneries set up Albacore lines and Bioproducts got more scrap even tho it was a fledgling industry.

Abbott Laboratories bought the tuna livers from C.R.P.A. to use as a source of Vitamin D. Bioproducts received the tuna viscera after the livers were picked.

Now most cannerymen scoff at by-products because they have marginal value compared to fish for human food. So C.R.P.A. was lax in picking all the livers off the tuna viscera. They always missed about 10% and one or two days a week they'd miss 100% of them. So Bioproducts set up a liver-picking table. High School boys were paid piece-work after school and an inventory of livers was accumulated in a cannery freezer.

Dick wanted to sell our tuna livers to Abbott, but I kept experimenting in the lab for a method of processing them.





Unlike salmon, tuna are feeding actively when harvested and consequently have very active digestive enzymes. If a person picks livers with bare hands for an hour or two a day for several days, the digestive enzymes will digest part of the skin off that persons hands. So the liver pickers wore rubber gloves.

The livers at C.R.P.A. were quickly removed from the cut ^{viera} whereas our livers had been steeped in strong enzyme for hours. This was beyond our control but it made a big difference in the process used. Not that we knew the Abbott process. Even to this day the various liver oil processes are still well - kept secrets.

Eventually the process was carried as far as it could be carried in the lab and it was time to try it on a pilot plant scale downstairs. Once it was a slack day and the crew found it fund to toss jibes back and forth. The work had enough technical troubles without the harassment of oblique remarks, so finally I went up to the lab and sat glumly looking at the floor. Dick came in and asked how things were going. I said "Nothing but wisecracks." Dick paused a minute then said "I'll put a stop to that!" and he practically ran for the stairs. In a couple of minutes he reappeared, very serious and said "I told them to shut the boiler down and go home. If they wanted to work to come back in the morning. If they didn't want to work to not come back because we didn't want to see them again." Never once thru the ensuing years did the crew ever again attempt work-slow down. Dick never raised his voice or pulled rank or showed insecurity. We all knew that he held a royal flush in trump.

The crew was often curious about some project that I happened to be working on. I quickly found that it never was satisfactory to tell them I didn't want them around. That was like shoving. So, better, I said "You can look to your heart's content. But I can't answer your questions because this is what I'm paid to do." They always immediately left.

So Dick and I would start to work in the plant at five o'clock when the crew quit. We didn't work every nite but we worked for four hours at least three nights a week.

Often Dick would have me up to his house for our delayed meal afterward. I remember one night as we entered the front door Dick's grade-school-age son greeted him with the question "well, how much money did you lose tonite?" Dick mumbled and answer. I was well aware that the situation was grim. The night before we had also run a test batch.

In about a month Dick phoned me at the Ocean Labs and talked for a long time. The oil inadvertently had been shipped on a Straight Bill of Lading instead of on an Order Bill of Lading; the F.E. Booth Company said that the oil only assayed half of what Bioproducts claimed; that the oil had to be cleaned up; that they would have to charge for cleaning it up; that is no cleaning it, there would be at least a 50% loss in potency; that they didn't want to return the oil because they now had an investment in the oil. On the phone we left it that Dick would get the oil back to Astoria and look for another buyer.

He got the oil back and sold it to a drug company on the East coast at Bioproducts price and Bioproducts assy and with no penalties attached.

The next time I was down Dick said "that almost sank the ship" The cost of the oil had been minimal but the creditors up town had "gleaped" (John's words) so much that Bioproducts had amalgamated the debts into one short-term mortgage, expecting to pay off the mortgage with the F.E. Booth money. The financial situation became so tense that Dick mortgaged his life insurance for the desparately needed chsh. Bioproducts fate was balanced on a knife edge. Dick and John warmed a can of soup in the lab for lunch and I ate soup in my lab in Seattle. The crew, among themselves, considered suing for back pay but didn't. The crew was told, and the stores up town were told, that nothing was to be purchassd for Bioproducts without a signed purchas order. Dick signed the P.O.s. But it was more pleasnat to do without than to get one signed, Bioproducts used the pioneer creed: "Use it up, wear it out. Make it do or do without." A financial report on F.E. Booth said that they were noted for "their sharp business practices." They were not the same as Booth Fisheries in Seattle.

Since my overtime, and Dick's, was "free" alsmost the entire sale value of Albacore liver oil was profit. We had a boy from Kentucky helping part of the time but overhead and high school labor was ignored. Thus Albacore liver oil took its place as a major product.

After Dick had started to work the night before he had a very bad test batch. While heating a tank with steam, the chatter of steam-hammer had vibrated a sanitary plug valve loose and fell out on the floor. I was up on the tanks and Dick was down on the floor by the Rotojector room door. Our valuable hot emulsion came pouring out onto the floor. I jumped off the catwalk, laid my back in the hot soup, and stuffed the valve back in place. It helped my ~~image~~ a lot.

Finally we had a process and started running tuna livers after the crew left for the day.

In order to find out what our oil assayed in Vitamin D we bought a 4-deck broiler cage. I think that Harold Carrington's first job at Bioproducts was to take me up Youngs River to get the cage with the truck.

The method of testing was to feed/baby chicks the oil at different potency levels. After 3 weeks the chicks were sacrificed and an oil-free tibia was ashed. The minimum amount of D to give maximum ash was 1 chick unit. There also was a rat unit and it was something else again. I think the chick was D_2 and the rat was D_3 .

The test was clear-cut and decisive and the oil ran around 15,000 chick D/gram. I think there were several drums of oil and I think it was worth just under a dollar a million units. Whereupon I returned to the U.of W.

At college Dick and Ray Matson had been fraternity brothers. Ray joined the Wilbur-Ellis Brokerage Company and was, at least eventually, in charge of their Pacific Division. Dick had complete confidence in Ray and altho Ray sold all of Bioproducts production, he must not have sold this albacore oil or the W-E clout would have been applied in the trouble that followed. A sale of the oil was made to the F.E. Booth Company of San Francisco and the oil was shipped.

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Dick and I corresponded at least every month or two by long hand while I was in Seattle, so I had many letters from him. My venture into the fine arts was in poetry; his was in bitten etchings and water color. He sent me a poem or two that he wanted me to clean up. I never got around to it and may even have them around yet. Maybe by now, with the free verse, free rhyme, free meter, and free everthing, it wouldn't need anything done to it. Dick's father-in-law was a poet of some note.

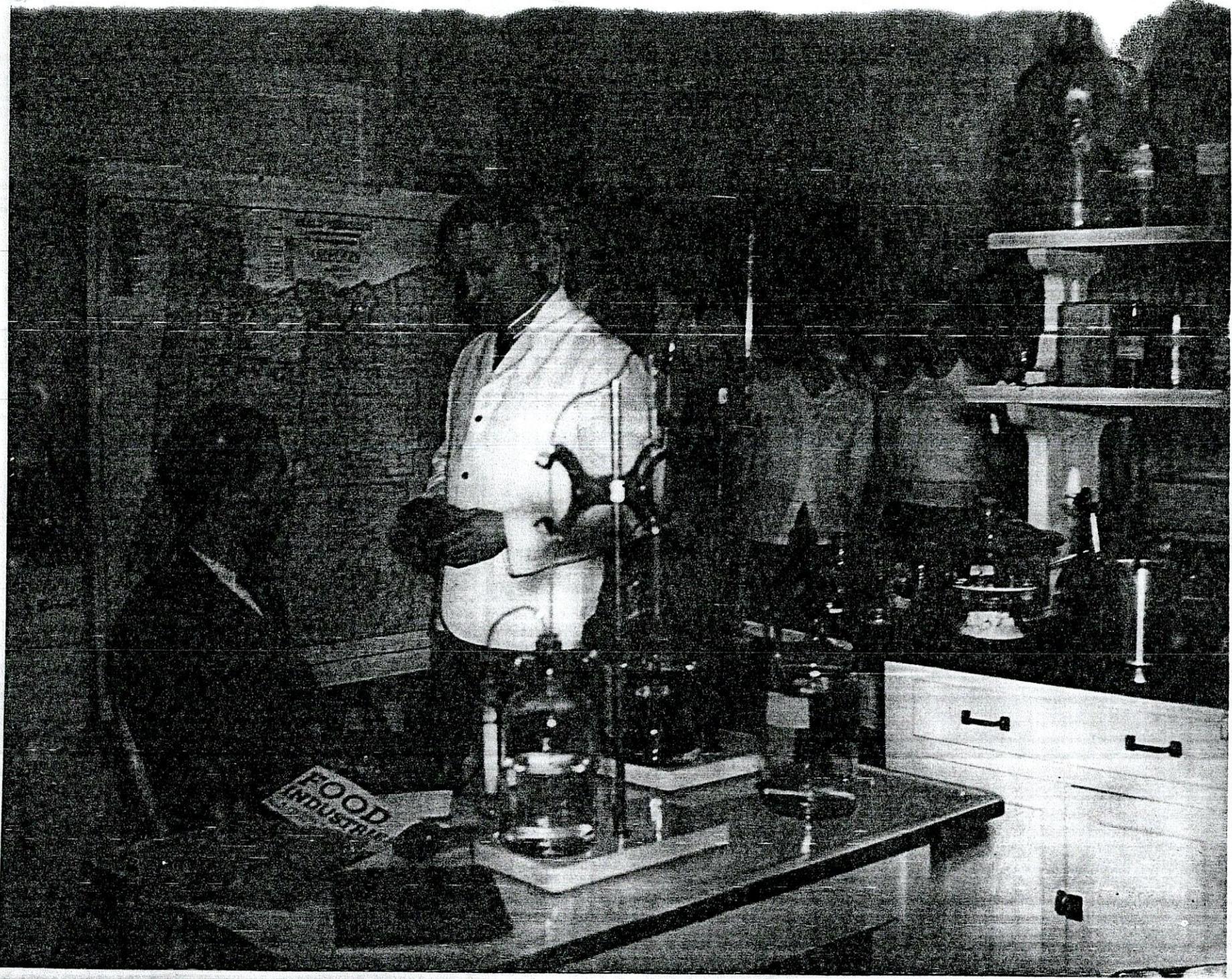
Relations with C.R.P.A. have always seemed cool. C.R.P.A. was an amalgamation of packers before 1900 for the purpose of labor negotiations and a united marketing front. As could be expected, almost immediately independent packers appeared outside the combine and small groups within the combine sought to control the combine stock. When I came to Astoria, W.L. Thompson was president. Some of the fishermen called him Tulie Thompson because in his earlier days as a fish buyer he acquired the reputation of down -grading traps of fish by calling them Tulies (Tooleys) which was the Columbia River name for a salmon in a run past it's prime. I suspect that the name came from the Sacramento. At any rate W.L. didn't like Dick. So when Dick went over to C.R.P.A. to try to buy their Albacore livers for the next season, he talked to Wright and Tom Sandos. But W.L. came by, listened a minute and said "Just tell the boy we dont think he's big enough to handle the job." Dick came back in a blue funk. When W.L. died, his son Ed took over, then Tom Sandos, then McGowen, then Castle and Cook. We didn't do anything to incur their displeasure. But they passed on from man to man, year to year, a critical image of Bioproducts even tho management at the two plants turned over completely in the meantime. Bioproducts had to have their scrap to stay alive at times because that was the only raw material. Out of it, however, many products were made. When Bioproducts didn't get a contract for C.R.P.A.'s livers it was not a disaster, it was fortunate. Before the year was out Vitamin D was being made synthetically and the price fell lower than a worms ankle:

Dick would walk thru the lab, from the plant, then turn back in and say, "Lyle, what are we going to make tomorrow when we can't make what we're making today?" The he'd go on. He always wanted year around work for the crew.

So we drove to Bellingham to persuade Pacific American Fisheries to let us make canning oil for them in Alaska. Also most all of the Columbia River canneries had their own oil rooms now. P.A.F. was interested but didn't go for the idea. P.A.F. later skinned their Copper River Red, wholly at my suggestion, but they wanted to do it their way.

As the icy grip of the Depression relaxed a bit, some people again could afford mink coats so the mink industry became in need of mink food. Bioproducts reduction press was turning out press cake by the ton so Dick created a sales department to sell it retail to the mink farmers. Besides Puget Sound, Minnesota, and Salt Lake, Clatsop County was an important mink area. Dick hired Bob Holmes as sales "manager". Bob had a wife and two sons, had gone to Oregon, and had worked for an advertising agency. Bioproducts marketed a vitamin A and D oil, wheat germ oil, a little press cake packed in No. 10 tins and some other items. Bioproducts also published a monthly magazine "Columbia Empire Furs" for a year or two. The biggest competitor was Purina which Bioproducts paraphrased 'paruna' after a mink rancher's mispronunciation of the name. Bioproducts attended the association meetings and the ^{annual} fur auction of the Seattle Fur Exchange with all the attendant back-slapping, the Auctions were very colorful and stamped a mark of professional rank on the ^{who} rankers commensurate with the price their furs commanded. Paul Autio, ^{who} makes Bioproducts Autio pumps, was a marginal mink farmer in those days. None of the products sold to the mink industry ever reached the "major product" class for a ^{whole} years period.

Bob Holmes was personable and he liked a conversation altho he never monopolised it. Since his salary at first was \$100 a month, he became proficient in deficit financing.



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J P Trullinger - Sect. Treasurer	Native
RT Carruthers - President	Native
Vincent Day - Cooker Director	5 breed Clatsop
Harold Caddington - Plant. Supt.	Ex. cowhand
Oruso Pippo	Mining Supt.
Nat Tallant	Shipping
Margaret Koc	Native
Baronelle Hess	Chemist
Ellen	Chinese English
Wild Bill Reed	N. Dak. jackrabbit chokers

Taken Oct 20 - 1945

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During the day, for a break, he'd come to the lab to smoke a cigar and shoot the breeze. One time I had just killed a batch of chicks with ether for a Vitamin D test and tossed their carcasses in a large garbage can. I didn't see Bob come in. When I looked up he was flicking his ashes in the garbage can. Then -- Whoom -- and a ball of flame whooshed up past Bob's mustache. After that he always asked first if it was safe before entering. He went on to become a state senator and then governor of Oregon.

Besides having an insipient givernor on the payroll, Bioproducts had a chinese boy who wanted to sing opera. His job was to feed raw salmon scrap to the grinder at a steady rate. So, splashed and gory, he poured garbage can after garbage can onto the feed belt while he sang grand opera at the top of his voice.

Then Dick noticed that one of the boys, just out of high school and named Orvo Piippo, was unusually thorough when he cleaned up a place. So he had Orvo come at 5 and start cleaning up. This is generally an unpopular shift but Orvo's cleaning is still unsurpassed. He was at Bioproducts before I came and was still there after I left. Now he works in engineering and millwrighting. Orvo could also draw noticeable well. Added to this, Rich Carruthers, in later years, also was uncommonly handy with a pencil. This profusion of art all over the place made some of us feel like we had been overlooked while the ~~goodies~~ were being passed out.

Dick had a fairly young crew at that time and he picked Ellis Koven to be foreman when Ellis was only about 18. The next foreman was Julien Falleur who had some sort of a Reserve Commission in the Army Engineers Corps. Harold Carrington, a dust bowl emigrant, was the next foreman and, instead of a mere year or so, he held the job for 30 years.

The hardest-working and most productive employee Bioproducts ever had was Kenneth Kunkler. I have seen him produce a 10,000 gallon car of Ortho-Gro in one 25 hour shift, more than the two next-best-men would do. Most men

cannot up-end a 55 gallon drum of oil. I have seen Kenneth up-end 15 drums of hot lye-water, one after another, and run to another job.

One idea I had that I didn't know how to hatch, much less nurture, was a Bioproducts Quartet. Herb Salmi sang a little semi-professionally; Eric Schmidt and Orvo Piippo had unusually acute senses of pitch and melody; Mark Dossier, our whale flenser often sang as he worked. If someone could have welded these four into unit it would have been a winner. I also know that even a 4-horse team couldn't have drug some of them before an audience.

If an egg-producer changes the protein level of his ration, it throws the hens into a moult, and this might be financially disastrous to the farmer. So the feed blenders must receive ingredients of uniform assay. Our fish meal ran from a low of 48 on Oregon Albocore and 30% on crab to 70 or 80% on shark. It always seemed to be good policy to sell a processed item rather than a raw material. All of this drew the conclusion that we should standardize our meal at 60% because if we didn't somebody else had to.

Running all the assays of the lots and supervising the blending got to be quite a chore. So Dick hired a hospital lab technician, Beverly MacCormick, to do this. This was in the late 50's and was before Women's Lib blossomed. Beverly ran the meal room with great efficiency and our rough and ready crew believed her and acted like gentlemen.

When Vitamin D was made synthetically by 1939 or 40, Vitamin A became the rage and Bioproducts wanted to get into the act. So Dick and I drove to Nahcotta on Willapa Bay and chartered a gill net boat to catch some dogfish to see what they were worth. I guess we must have helped some but we mostly watched. I remember the skipper had a bum knee that had been spiked with a gaff hook long ago and was very fearful of my amateurish gaffing. We got some small dogfish shark whose oil ran under 1000 A/gm which was abysmally low. So Dick worked up a deal with George Muscovita to trawl off-shore. George's dog fish ran 25,000 to 30,000 A/gm and George became an important source of livers. I went to Puget Sound alone and went out with Joe Belanich

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on the "Ellen" dragging dog but the liver oil ran around 10,000 A/gm. The most valuable of shark was soupfin shark. Their livers were about 50% oil and the oil ran from a low of 40,000 to a high of 120,000 A but was generally about 180,000. George ^{Burchard} ~~Burchard~~ left Abbotts and started Washington Laboratories to make liver oils on his own. There is a picture in a monthly Pacific Fisherman of George paying \$22.10 a pound for a trip of soup livers. The schooner Tordensjold delivered on trip of soup that sold in Seattle at \$65,000. One ^{trip} ~~trip~~ can see that Vitamin A became Bioproducts next major product. Tank cars were spotted on the track outside the boiler and were filled with dog oil there.

Ling cod livers at sea off the Columbia River sometimes made oil that ran ^{the single drum of oil} 600,000 A/gm and at 52 cents a million units of A would be worth \$60,000. I have insured single-trippers at over \$30,000 when they were shipped. There wasn't much, if any, skuldugery among the six or eight liver oil ^{factories} ~~factories~~ on the Pacific Coast. In fact there was a camaraderie of sorts because when the price of A was rising they all rubbed their hands and smiled, and when the bottom finally fell out, they all went to the Wailing Wall together. A gambler won't cheat when playing against another ^{partner} ~~gambler~~.

The companies processing lean livers, as they were called, all used substantially the same process whether the livers contained Vitamin A or Vitamin D. However the Vitamin A livers were generally in better condition than the Albacore livers. Some Albacore liver oil went over 30% free fatty acid despite being a light colored oil.

Branchflower built a solvent extraction plant in Ballard, Seattle, for livers and it blew up. Wash. Lab had a centrifuge bowl fly off the spindle and it took out part of the building. Fifteen horsepower winding up of 15 minutes becomes quite a buildup of power.

Vitamin A was a major product by anybody's reckoning to Bioproducts. Even after both A and D were made synthetically, Bioproducts still dealt in the two vitamins substantially. One item was A. and D Feeding Oil. These oils

were sold at several potencies and were quoted nationally in Feedstuffs and in Oil, Paint, and Drug Reporter. Bioproducts ran tuna viscera thru the cooker with a "wash" oil and had a several-drum lot assayed in the mid 1950's. This was ^{feeding} mixed with dogfish shark oil and salmon or shad oil to make 3000A, 400 D oil. When salmon and shad oil got scarce, tuna oil was purchased ~~from~~ Bumble Bee. A light-colored oil runs out of Bumble Bees' cookers when they precook tuna. Albers bought this feeding oil, for a long time, but stopped after we couldn't get salmon and had to use tuna for blending oil.

Bioproducts reduction plant in Astoria was only a block upwind from a residential section and it got all of the invigorating aroma of our driers. To condense ~~the~~ to cooker and drier steam, Bioproducts had a water-spray scrubbing tower. The tower also was fed with chlorinating gas which was supposed to help cut down the fish smell.

Every Monday morning when the neighbor women hung out their clothes, Bioproducts would get a rash of phone calls and it was John's lot to placate these housewives. He'd patiently listen a while to their complaints and then explain that we'd just received a small amount of fish and that it was all gone now, or, that the boys must not have turned the chlorinator on but he'd sure get it done. After a while he'd say "Oh sure, sure; of course, of course, that's right, goo' Bye, goo' bye!" And he'd drop the phone on the hook without giving them a chance to continue. Then he'd audibly expell 2 3/4 teaspoons of air thru compressed lips and return to his tasks in hand.

Dick drove me over to Warrenton to see some possible sites for a reduction plant. He said a reduction plant should be off by itself with no neighbors at all. At that time the echos of the short pilchard boom were just dying out. There had been several pilchard reduction plants on shore and one big floater. But it took several more years for Bioproducts to get out of Astoria.

The smell on one's clothes and skin were hard to remove. One Saturday I took a

took a good shower at } the plant before leaving. There was 80# on the water line and 100# on the boiler. All one wanted, and it would drill holes in your back. You couldn't fact it. When I got to Mrs. Stacey's boarding house I took a hot, soaking tub bath before dinner. After dinner I went down to Andrew's and Steve's pool room to kill a little time before going to a dance. Since I still had a little time I went back to the boarding house and took a 3rd bath 'just in case'. Then I went to the dance. Before long a girl said, "you work in tuna, don't you? I know. You just can't get rid of that smell!" So Bumble Bee may say that their cannery line girls would rather get food stamps than to work. But maybe the girls just don't want to smell! Orv says a Finnish Sauna won't do it in one fell sweat.

By September 1940, I had spent 3 months of each of the last 4 years at Bioproducts. Then Roger Harrison wrote me a long hand letter. The Fish and Wildlife Service was building a fishery products laboratory in Ketchikan and needed me for a by-products man; the man that would start our in-charge (Maurice Stansby) would be pulled out in a year or two and I would be left in charge; the starting pay for me would be 3 times the rate I now receive (and, cash); if I wanted the job, it was mine.

It was a tough decision to make. Bioproducts was 100% challenge and I liked it. But I had seen Bob Holmes struggle on his salary and I had a girl-friend in Seattle who was someone 'special' to me.

I worked the month out and started for Alaska, marrying the girl the morning we sailed. When we got of the boat in Ketchikan, we had \$40 between us but John paid up as soon as he could.

Later, Dick wrote that they were reorganizing into a limited partnership by the name of Bioproducts Oregon, Ltd. and that is seemed best to cash in my stock at its currant valuation. My name was on the books but there were no certificates. The company had grown and I was to be given the current book value for my stock.

Close after the war, Bioproduct started the plant in Warrenton. The two little meal driers in Astoria were stretched out half again as long as they were and became drier 2 and 3. I don't know where 1, 4 and 5 came from. ^{plant moved} Some reduction and equipment was purchased from the old Farallon plant in California. The Warrenton site was tax-foreclosed land of the county and had once been the site of a Matteson slaughter house. Some of the old maps show a square acre of land outside of the tracks as a parcel but I don't know why. At the time Bioproducts moved, there was at least a couple of hundred feet of dry sand outside of the tracks. Dick told me that they had waterfront rights but I still don't know what that means, then or now.

A dock for fishing boats was driven and then a pier to shore. Later it was found that repair pilings could be set quite easily with a water jet. The original plant in Warrenton was small. The big sliding doors to the fish bins are in a wall that extended thru to the tracks and that formed the outside wall. When meal prices were low, the meal inventory would increase until there was no room to put it. Sacks of meal were piled so high that they filled the soffit of the ceiling joist. In this small plant there once was stored over 10 cars of crab plus some tuna meal. The space where the evaporators are located now was filled with meal. We joked about whose office would be filled with meal first. Meal was stored at Pacific Shrimp too. ~~but not much~~

The crew complained somewhat when Bioproducts bought the Hyster, which was the first fork lift truck for the plant, because they thought it was taking work away from the crew. However after a while some of the crew became so dependent upon the fork truck that they would stand and wait for the truck rather than move a single sack of meal by hand. A hot-rodding fork truck is very dangerous and should have a ringing bell whenever it is engaged in gear.

After the war, Eben had left the Ivy League, was working for the Gould Pump Company, and longed for the salt air of Oregon. The tuna packers couldn't think of any way to fill tuna cans but to use a girl's thumb and forefinger.

Eben could. He could think of several ways, and he wanted a chance to try. So on Bioproducts land, some leaky garage-like structures were built for a machine shop. Bioproducts put in some money and E.H. Carruthers Co. and Bioproducts traded some stock to lend stability to each other. The first method used a machine called the Pac-Former and altho it was sucessful, Eben wanted to improve on it with a machine he called the Pac-Shaper. It did to tuna what the cotton-gin did to cotton and, as a side-effect, it built Eben an inventor's dream of a plant -- and staff. For Bioproducts, the dividends came in real handy a time or two.

At about this point in time, the early 50's, Yours Truly entered the scene again. In the interval, Bioproducts had gone thru several chemist and at one time had three or four chemists in the lab. The big object was to learn the rate of hydrolysis of protein in alkaline solutuion, but dont ask me why. As an outgrowth of this work it was found that a tank full of eel could be digested to a relatively clear solution and that that solution could be spiked with fertilizer chemicals to give an N-P-K of 10-5-5. Since a tank of fish was the start of things, it was claimed that this was a glamorous "fish-fertilizer." The trouble was that in the prolonged alkaline boiling process, the caustic soda displaced 99.9% of the ammonia, and I mean truly. The entire nitrogen of the formulated fertilizer came from urea. It cost ~~76¢~~ ~~765~~ a gallon to make it and chevron Chemical or it's subsidiary, California Spray Chemical, paid \$1.20 a gallon fob Warrenton for it.

By using clear solubles or clear Tuna, cooker-drip, and no lye, I got the protainaceas nitrogen up to nearly 1 per cent and the cost from 76¢ to 37¢ a gallon by not adding alkali, loosing fish, and neutralzing back with acid. I dont know how many cars were sold before but I know it grew to 8 or 10 cars a year. Chevron asked for an affadavit stating how much of each of the fertilizer counts came from each ingredient in the formulation. Ortho Gro, as Chevron called it, became the Sweet-heart of Bioproducts. In round numbers, 100,000 gallons a year would return a profit of \$83,00 -- not just

sales. Late in the 60's, Alaska Bish Fertilizer woed Chevron away from us.

It like to broke our hearts.

An enterprising man, Lee Critchleau, used to watch the eels at the Falls in Oregon City. The eels would jump out of the water and fasten their suction mouths to the rock wall. Then they'd switch their tails and advance their hold 6" or so higher up. This way they'd go above the Falls. There was a road nearby. Now Lee fastened a porous screen so that the eels had to cross it. When they lost their suction on the porous plate, they fell into a chute and the chute led to Lee's waiting truck. When the truck was full, he drove the load to Bioproducts. It is of such stuff that heros are made. Eels were received from maybe 1947 to 1952.

The eels reduced to an oil that ran 20,000 A but I dont know the per cent oil. As long as natural A had a market there was an opportunity for money to be made in eels, otherwise not.

One time dogfish was being hauled by Alderman to Bioproducts in Warrenton and were dumped on the apron outside the plant. But the pile got so big that the truck couldn't get near the feed screw. So Jake Bosshart's gas shovel was used to move the pile of shark. Altho dogfish were fished intensively at that time, the stock never diminished as other fish stocks do. Apparently the number of dogs depends only on the food supply. Dogfish are not an edible human food, at present, but soupfin shark are as good as sturgeon any day (says me)

Dick didn't like the practice of carrying all of our eggs in one basket or to pin the companies fortune on one all-important product. So diversification and retail sales became the policy.

Lemon grass oil, as a base for synthetic A, had knocked the props out from natural A. The price had gotten as high as 52¢/M and the first earthquake

shook it down to 30¢. After-tremors took it down to 20¢. At 15¢ the fishermen couldn't take time to liver even halibut. Halibut had been the queen of liver oils. But the price kept falling like the 1929 stock market. It fell finally to 1 or 2¢ tho it stayed a while at 4¢.

Dick was always interested in the commercial opportunities associated with medicine. He was a close personal friend of Dr. Stromfjord who, in turn, became interested in the therapeutics of vitamin A. Dr. Otto George (?) of Clatskanie also worked on A, using it with notable success for epithelial burns. Dr. Stromfjord chiefly used it for deficiency conditions of epithelial tissue. Beyond any doubt there was substance to each of their investigations because that line of work keeps cropping up in the literature yet, even tho the two are gone. Many a fisherman has had skin and epithelial tissue killed on part of his body from eating fish livers, and the same has happened to Artic explorers when they ate polar bear livers. Yours truly also has some rueful personal memories.

During WW II there may have been a federal subsidy to Bioproducts for study of visual dark adadaptation as affected by Vitamin A dietary levels.

Bioproducts added all of these thots together and started retailing Vitamin A capsules under the name Biopharmaceuticals. Soon several vitamins at several potency levels were sold both retain and to drug stores. The big "pot-boiler" was 100,000 units of A in a 7 minim gelatin capsule sold as Oleum A. The 50,000 unit capsules were slightly different color and were called "Oleum A Halves" and the 25,000 unit capsules were called "Quarters." Then there was Oleum A and D, Biopalmin, Biomoidin, Eiovita vitamin A face cream, and a few others.

The 10-5-5 liquid "fish" fertilizer was retailed in 5 gallon, 1 gallon, 1 quart, 1 pint, and $\frac{1}{2}$ pint containers. The price was \$5 a gallon or \$20 for 5 gallons fob Warrenton.

When these items were sold to stores for resale there was a mind-boggling series of discounts.

When I returned to Bioproducts from my sojourn in Alaska, there were 4 or 5 girls in the office, mostly assigned to direct-mail advertising and some production work. There was a shipping Clerk. Retail sales of Biogro exceeded 4000 gallons by the late 1950's and retail sales of vitamin products also grew steadily. We encapsulated a 55 gallon drum at a time and there were always 3 or 4 levels offered for sale.

Another direct mail sales item was BioVita Aquarium Food. This initially was screened fish meal but after the advent of the Oregon moist pellet, that formulation was used to produce a fine, a medium, and a coarse granule. The number of people having tropical aquariums is sizeable. It's like someone growing African Violets, maybe, if there's a fish food or a plant food that works, they'll pay a ridiculous price for their 1-minute a day hobby.

These advertisements were consumer addressed by an addressograph machine using lists from people specializing in "sucker-lists". The literature for stuffing was turned out by the girls on a one-sheet-at-a-time mimeograph.

Bioproducts made its own liver oils for a long time but gradually liver deliveries fell off. To get the oil encapsulated, 55 gallon aluminum drums of oil were shipped to R. P. Sheares Do., Detroit. They used the plate method and there was about 10% loss of oil. Maybe it was the same nature of loss that sometimes happens in a meat cutting ship.

We encapsulated vitamins at a potency of 5% over for a safety margin and I think that figured out to 243,000 IVA/gm oil for Oleum A. When we couldn't get livers with a potency of that level, we bought some oil from Western Chemicals, Ltd (Gallagher and Chalmers) in Canada. Then U.S. Customs started stopping the shipments at the border because marine fish oils contain chlorinated hydrocarbons. There isn't the mechanism at present to stop American-caught

fish from being eaten in the U.S. Dieldrin and Aldrin can't be sold at all in the U.S., but tank car after tank car goes to Central America and its all one ocean. Meanwhile U.S. forsters see nothing wrong with dumping plane load after plane load of 2,4,5T on our forests because "it just runs off into the ocean and does 't hurt anybody." However, the crowning blow to Vitamin A pills was when the U.S. F.&D. said that the daily requirement of Vitamin A is 5000 or 6000 A and that there is no need to put more than that in one capsule. This position doesn't recognize the possibility of therapeutic effects nor the need for them. Neither tenet is true.

Dick had planned to use a number of Greek words to go with Bio to make a family of Bio-products. However Bob Holmes stoutly resisted this. He said it was tough enough for a small company to make Bio Vita a household word without compounding the handicap. Dick still used English words like Bio Gro and BioFish. Many customers hyphenated the name Bioproducts and still do, unfortunately.

I think Bioproducts was the first to manufacture a "liquid fish fertilizer." However hungry eyes were watching all the time. Eventually it got to where our competitors were selling our-type product in the supermarkets for under \$1 a gallon.

Other types of fish-base fertilizer were also made by Bioproducts. One was a 5-2-2 made up in solubles. Solubles couldn't be raised to 10-5-5 because the protein would salt out, as I remember.

Then there was a 5-9-9 dry fertilizer that had a fish-meal base. A polished tuna bone has a substantial nitrogen count but not as high as fish (muscle) meal and when it is sold as fish meal per ton-unit-of-protein, the phosphorus in the bone is given away free. So we de-boned all of our fish meal and made the bone meal into 5-9-9 dry fertilizer. This also raised the protein level of the meal remaining and put it in a higher price bracket. We used "Natural"

mine-run carnallite from Carlsbad, Texas as a source of potash. Since it was openly declared to be "natural, mine-run" potash, the fish meal 5-9-9 was enthusiastically accepted by the organic gardeners. It didn't contain any of those horrible ingredients of chemical spit, ^{partic} patin, -- fertilizers. The organic gardeners would bring in one of their organic apples to the lab, together with a store-bought one, and ask me to just 'see' the difference. I always agreed that they sure had a real winner there.

This "organic" and "Natural" and "No preservatives" craze seemed so distorted to us that we laughed thinking of the possibilities of bottling ocean water and selling it in mid-west but we weren't ready for a 'medicine man' act yet. There was a fellow from the mid-west who drove his new car into the surf by the Peter Iredale and washed off the road ^{grime} with a sponge so it would look nice and new.

The potash in our 5-2-2 "emulsion-type," as people call it--and whatever that means -- came from carnallite. The potash in the 10-5-5 clear came from tetra potassium pyrophosphate. Red blood cells contain a small smidgeon of potash but otherwise fish just don't have much potash in their bodies. However our 'emulsion' competitors were labelling their product "100% fish." So we had our brokers find out from where the potash originated. The broker said that that particular manufacturer wouldn't buy a tank of solubles unless it contained 2% potash. So the solubles manufacturers afforded him that accommodation. Then the fertilizer manufacturer could blandly ^{say} "No, we don't add any potash." We chuckled about this.

We made 4000 gallons of liquid fertilizer for Fred Meyer. They haggled the price down to cost plus and we had to use all of our cost expertise. In payment they took an unearned 10% and left us the alternative of suing. We remember it ruefully and didn't care for another sale.

It was part of your education to watch John type. With his thumbs pressed against his index fingers he pecked out a wicked pace. I asked him once how fast he typed but he only mumbled a brush-off answer. So I pressed him for a figure. He said "Oh 50 or 55, I suppose." And I didn't doubt it any. But that wasn't all. Bioproducts' phone bill was very high by 1955 and a Teletype system was put in as an unsuccessful attempt to reduce it. Almost all of the calls were to Wilbur-Ellis and there was a 3 o'clock schedule with them, as I remember it. If the girls typed, they would have to be told ^{all the time} what to say but Dick and John had the policy all prearranged. So with two fingers and a ready wit he plunked out 50 words a minute on the Teletype. As he typed he used what ^{we} call CB jargon today, replete with a full complement of wise cracks. He omitted all vowels just like 1880 soundex. We would gather around the teletype to see what was going in and coming out. It was the laugh of the day. The cadence of the chatter was quite bewitching.

Early-on after I returned to Bioproducts there was a collaborative project between E.H.C. Co. and Bioproducts. The Pac-Shaper didn't clean the loins, it only filled the cans. A company was formed between the two companies to have a try at machine for cleaning tuna. Bumble Bee alone currently has over 200 girls on the cleaning tables so its something that somebody will solve, sooner or later. The new company was called "Fish Processes" and I was assigned to work on the project. It was a joy to work with Eben again, as I had assisted him on a centrifuge invention of his once. It was like a catcher and a pitcher throwing warm-up strikes before a ball game.

We came up with "a" method and it was covered in two patents. I was the senior of both patents but the attorney thought that it would be received better by the tuna industry to list Eben as the senior on one. I was happy to have my name on any of Eben's patents any time any way.

I flew down to Van Camps to give them a demonstration. Their steam was from a public central plant over two blocks away and the thermodynamic quality of

of the steam was lousy. As a consequence the results were nothing like what I got working off a superheater close by Bioproducts boiler. Later a company phoned me from Maryland and asked if we were licensing. I told them to talk to the principals since I was only a lab man. I dont know how it came out. The patents are expired.

If a sizeable sample of tuna scrap is taken at the delivery truck, the sample ground and resampled, and the re-sample is dried, the reduction ration is much higher than "raw scrap" to meal ratios in the accountant's office. So something was fishy. When the stickwater is sampled at the centrifuge water discharge orifice and measured, the protein content of the water is large. When I told Dick and John in 1954 that we were running 30% of the fish, that we hauled from Astoria, into the Columbia they didn't believe it. We had a plume a mile long in the Columbia and the Coast Guard had pictures of it.

I tried to concentrate the stickwater by submerged combustion in the lab but it wouldn't get even close to 50% without scorching. Also it was much too tricky for the crew in the plant to handle.

One day Dick told me that he had bought a used triple-effect evaporator from Western Condensers for \$30,000. So now we had to learn all we ~~kn~~ could about solubles.

Van Camp learned that we had an evaporator so they sent Sven Lassen up to try to get us to use their patented process. However that didn't sound good so we worked on the problem a bit, ourselves.

Discharge water from a centrifuge will have a little oil left and also two kinds of protein, soluble protein and suspended protein, or fish meal. The solids content will be something like 4 to 6%. Thus if the finished solubles are to be 50% solids, 100 lbs of stickwater will have to be evaporated to 10 ~~100~~ lbs. This will be a 10 times concentration, as one way of looking at it. However unless the ratio of the soluble protein to the suspended protein is proper, ^{and} plus an appropriate treatment of both the ~~sidded~~ ^{and} suspended ~~sidded~~ dissolved

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protein is also accomplished, the solubles will not create a falling film at 50% concentration. It goes without saying that the oil level in the discharge water must be below 1% plus a few other things. It seems that all plants that ran liver oils and all plants that made solubles had a supervisory chemist because too many things could go wrong. Even then I know that B.C. Packers and Van Camp at times couldn't make 50% solubles -- would you believe 46%?

Thru sweat and tears we learned to make solubles by more than one method. We have run solubels down to more than 70% solids.

We had a use for solubles at 56% solids so we ran our production down to that point. Then the demand for that product didn't meet our anticipated sales so we had a surplus to be sold as solubles per se.

Now solubles were always sold on a basis of 50% solids, solids meaning anything that wasn't water. There was no premium for anything over 50%, no penalty for assays down to 49%. Nevertheless we asked our broker to hawk our goods for a premium. No soap. The buyers all wanted to 56% stuff at the same price as 49-50% stuff. We figured that if that was what they wanted, that was what they should have. So we fed the intake of a circulating pump with sea water, off the bottom of the Columbia River, until the assay was 49%. We did this as a regular practice for a while, always selling at 49.1%. Actually, the way that the uniform sales contract was worded, pure sea water from the Pacific Ocean could have been sold for solubles at a profit -- if the buyer would have stood still for that. Our solubles always ran around 1% ash while some companies' sols ran as high as 8% ash.

We always washed our empty solubles tanks, then lyed them out, and rinsed. This way we controlled mold and acidophiles. I asked a chemist of a large fish company how they washed their tanks. He said "Heavens, we can't afford to wash them, we just throw in 5 gallon of formaldehyde once in a while and we never have any trouble." Formaldehyde disrupts an animal's sense of smell.

The matter of assays for sale or purchase also came under scrutiny. I assayed one lot of solubles repeatedly, like maybe 50 times, to learn what variations occurred in assaying. Variations do exist and it is naive to go thru a few motions and think this is a simple assy. It would have been possible to trade in solubles and make money between the assays of two commercial labs. I developed an empirical method of assay of my own that I believed in, just like everyone else who thought that they alone were right. Solubles are very hygroscopic, even deliquescent, and dollars hang on the analytical balance. Laucks took too large a sample and Curtis & Tomkins over-dried. The moral was: Sell on Laucks assay and buy on Curtis & Tomkins. I don't consider this crooked, its just coveat emptor. No doubt times have changed. We had had a good schooling in the liver oil days when all deals were "eyes open."

Bioproducts always made an attempt to collect the commercial fish scrap in the area. Sometimes it got a little trying when someone would phone in for us to pick up a fallen animal or 500 pelleted-out mink, or a half drum of sports fisherman gurry that had their MT booze bottles and cigarette butts in them. We also had to scramble to use up or sell up to 10 cars of crab shell a year. Some of the crab we bled into the driers and some went for pellets. Any non-piscatorial meal went into dry fertilizer.

An outfit in Des Moines bought solubles from us and dried it on soybean meal. They sold the product as dry solubles equivalent to 50% wet solubles. Most small chicken feed mills couldn't cope with wet sols since they are rather intractable. So Dick wanted to dry solubles on crab shell, have 50% equivalency, 50% protein, and call it Full Fish Factor. That was a handful but we did it. We even dusted it with 500-mesh talcum powder and wheat middlings and shrimp meal at times to keep it from caking. Then it had to be sold and we stretched our imaginations a bit about its' virtues while selling it.

One of the various desperation tries was to get it incorporated in the Oregon

Moist Pellet. It turned out to have a growth factor all right and for quite a while was an ingredient in the production diet. It was finally removed because of the low quality of the oil it contained. If you want to see the world's worst possible oil, just extract some from some old solubles. Yet I purposely put some of the solubles-oil in a digest going on some test Friskies and the Carnation cats never batted an eyelash. Maybe they were hungry.

The Oregon Moist Pelle^T was almost 10 years in development. Jergen Westrheim, Tom McKee, and Joe Wallis (Sp?) of the Oregon Fish Commission collaborated with Russell Sinnhuber and Duncan Law of the Sea Food Lab. Jergen and Russ were quite creative. When the diet was ready for a pilot try in 1958, Russ coached C.R.P.A. on every step of the process. He had asked members of the fishing industry to endow the Seafood Lab with an annual grant because the Lab was working for industry's benefit. Dick said Bioproducts had a lab as long as the Seafood Lab had one and he'd prefer to spend his money on Bioproducts research.

The first contract was small, surely not more than 200,000 lbs and maybe not that much. Someone in Portland, maybe Bob Seufert, made the meal--maybe as a negotiated agreement -- but the extrusion pellets was a job contract by bid. I think C.R.P.A. was the only bidder besides Bioproducts and they bid wildly high. Russ said that the opportunity was practically laid in C.R.P.A.'s lap.

The first press was a 2nd hand vertical 2 cylinder batch extruder with hydraulic pistons. Frank Steiner ran that first press and he's still running the modern ones. Some people can make good pellets and some can't. The pellets were frozen in 50# cartons, 20x20x5, and frozen in an old surplus Navy freezer about the size of a ship's cargo container. We thought that the pellets would impact if they weren't in cartons. The cartons were heavily waxed, ^{with a} slip-over

top, and made of corrugated cardboard. They were expensive but were expected to last several trips. They didn't. The hatchery personnel ripped them to shreds.

The first pellets were fob Warrenton and were large, probably 1/8". We had lots of trouble making 1/16" pellets because we had a lot to learn. The next year we made the meal and the pellets both but they wanted a 3/64" pellet now. Sometimes we'd only make a bag or two of pellets all day due to trouble. We had changed to bags as containers this 2nd year. The third year they wanted us to make som ^{1/32"} pellets and of course that was harder yet but we had learned by experience. Next they wanted something finer than a 1/32" ^{so} ~~make a short 1/32 and then~~ so we made "mash" for the first time.

Our relations with the Oregon Fish Commission were ~~most~~ excellent but we didn't like to have the Seafood Lab tell a new manufacturer all of our trade secrets, ones that we had so painfully learned. The contract called for in-plant inspection so they saw ^{most} of the equipment we had invented and custom-made.

We had one competitor (Beerman?) for pellets in this area but due to technical troubles he couldn't survive the first year. There is a competitor up on Puget Sound that seems to keep going but he cries a lot more than Bioproducts does.

About 1960 Bioproducts built a good freezer and seemed to finally have good production facilities. However within another year or two demand had snowballed so much that another freezer- storage room 4 times that size was built. Then as more states came on stream, another freezer was built. When that became too small, Bioproducts turned to in-process quick freezing. Bioproducts has a 40 foot semi and a van to deliver frozen pellets.

The success of the Oregon Moist pellet lies in it's being a fully balanced food in pellet form. Prior to the OMP, hatcheries fed their fish by throwing

3X
a sloppy mixture of beef liver, pork liver, and pork spleen out in the water with a big spoon. It was a royal mess. The OMP was a good job well done. Trout can be raised on a much less sophisticated diet than salmon.

Fish pellets have been in the heavy end of the batting order at Bioproducts for a long time -- both in sales and revenue.

Prices for fish meal have been highly cyclic. Prior to maybe 1920, all fish meal went into fertilizer, altho I dont know how it was marketed. Then some body found that if 2% or so was incorporated in poultry rations it accomplished ^{great wonders,} miracles. Hens produced better and ~~did~~ broilers. The growth factors in solubles played a part together with antibiotics and general advances in ^{the} nutrition and genetics.

Vaguely, in 1915 it took 3 months to grow a broiler; by 1925 the time was down to 2 months; by 1935 it was down to 7 weeks; by 1945 it was down to 6 weeks; by 1955 it was down to 5 weeks. Imagine the cost of a 3 month broiler today.

In the late 50's. a mad scramble occurred as American companies, Gilbur-Ellis and NEFCO among them, sought to divert Peruvian and South African anchovies from guana into fish meal. They gutted the market. The price of fishmeal fell to \$1.16 a ton-unit of protein and Bioproducts had an inventory.

Dick had just recently told me that Bioproducts was now "current" on all of its accounts, the first time in all time, I think. Now he told me that he and John were foregoing their salaries to have some working capital. I didn't volunteer anything, I was feeding a family on \$400 a month (and people wonder why I'm so Scotch)

The companies in Peru formed a "Consortium" for marketing and the price slowly recovered.

Bioproducts set up a bulk meal handling system using our Hyster as a bulldozer and as a front-end loader. We could load either rail cars or trucks

by spiral flight conveyers. For all of the deprecations it has received, I am sure that at sometime or other meal ¹¹¹ ust have ranked as first in sales. We ran around 1500 tons of meal a year.

It seemed like Bioproducts was always short of working capital. As soon as we got out from behind one eight-ball, Dick would expand the plant, or buy a piece of equipment and there we'd be again.

Our property was listed with Lawerance Warehouse Co. and they would issue a warehouse receipt to the bank for such and such tank. John seemed to be always asking me "Lyle, we need some colateral, is there anything we wont ¹¹¹ ship for a week or two?" By 1950 the payroll was current weekly, or maybe it was fortnightly. But they were paid.

In the last half of the 1950's we sold an A & D Feeding Oil, I think 3000 A 400 D at 14¢ to Albers Milling company in Portland. One day Al Anderson, the manager, and Mac McKensie, a chemist from California, came down to see us. Albers was now owned by Carnation and Mac was ¹¹¹ an early Carnation chemist. They wanted to know if Bioproducts could make a liquid fish for them. Somebody in California had tried but couldn't get the assay up high enough and so it was too watery. I suspect it wasn't all low assay but that it was partly water of syneresis. Anyhow they said that they wanted 50%. Dick filled the back end of their car with whale vertabrate and we told them we'd try. They gave no inkling of their anticipated use. Dick told me to make something that was 50% solids and were going to call it Biofish 50. If I had to put rocks in it, he said, it has to be 50% or we were beaten in sight.

We could assume that it was an ingredient of an animal feed (what else?). So I took a shot in the dark. They bounced back, "MORE and QUICK".

Dr. Claus came up before too long. He told me "Dont change this in any way and dont talk about it to any one." He was very serious about it.

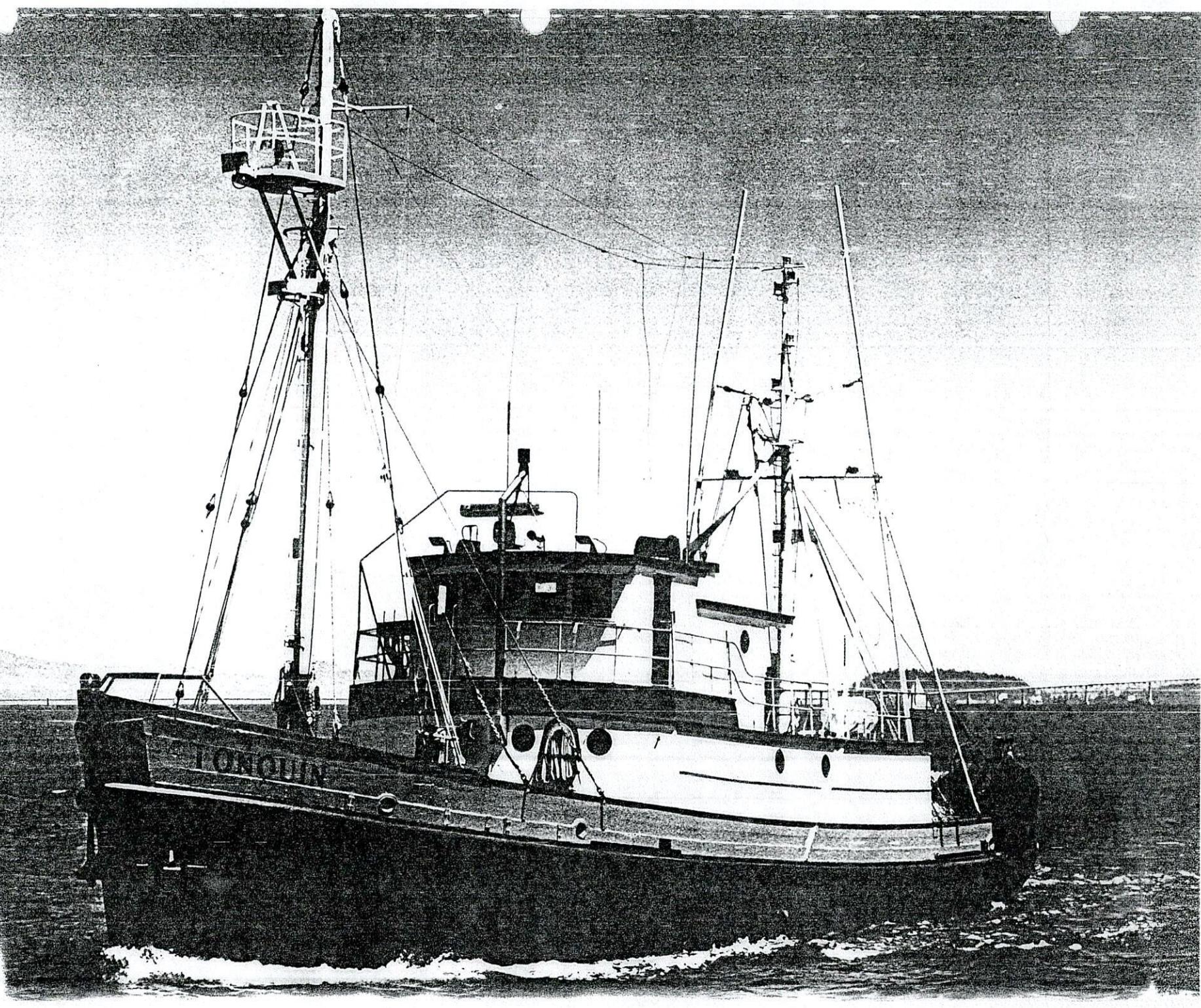
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It would be redundant to say Biofish 50 became a major product. We just hope we dont lose it. "What will we make tomorrow when we can't make what we're making today?"

MacKensie retired but came to Bioproducts after he retired. I asked him if he was happy or if he still wanted to work. He said, "I'd like to work for Carnation yet but I wouldn't work for anybody but Carnation." He spoke volumes in those few words.

Fish pellets and digest didn't have enough volume yet in 1960, or so, to keep the coffers filled. We hadn't heard of Greenpeace then or of much concern about whales. We had bopt some whale liver from San Pablo and there was whaling on Vancouver Island. So Dick bought a whale gun and some harpoons to have a try at whaling, as a source of raw material.

We toyed with the whaling idea for 3 years, which I think were 1963, 1964 and 1965. We fitted out and sent our, one at a time, the "Tom and Al" skippered by Eben and Frank Parker; an exmine-sweeper skippered by McCrosky (?); the Halawai, renamed the "Tonquin," skippered by Pete Petersen. At least part of the time Bioproducts owned this latter boat. We had two guns, a 50 millimeter gun with pointed harpoon head and a 90 millimeter gun with armor-piercing harpoon heads. We received 5 whales the first year, five the second and 2 the third. There were about 2 fin back, and the rest humpbacks and sperms. Products sold were frozen meat to mink farmers and Carnation, meat and bone meal for fertilizer, whale oil for soap, sprays, and feed stuffs, a trace of vitamins, and few pounds of tourists' baubles.

The whales had to be captured within fifty or a hundred miles of the river mouth or they would spoil, due to their large warm mass, before the landed. They were brought in alongside a vessel with the flukes lashed aboard at the ^{maxa-life} bow. Bioproducts bull-dozered a mes-like mound level with the R.R. tracks and surfaced it for a flensing deck. The whales were hauled up out of the water, tail-first, on a skidway of railroad rails. A gas engine winch with cable



was used for haul-out power and for flensing.

Mark Dossier, our flenser from San Pablo, would walk up the whale to the head with caulk boots. He would make two full length cuts thru the blubber with a flensing knife. Then a cable from the winch would peel back this section of blubber as Mark assisted with his knife. Somewhere along the process of flensing, each of the four loins would be peeled off also. Some of the whales weighed fifty or more tons and the loins probably weighed a ton or two each. The loins were cut into one or two-foot cubes and ^{cooled} collid in a water trough. Then they were ground, bagged, frozed and sold for animal food.

Local mink rancers bought some and Carnation bought some for the Hillsboro plant.

The loins were slightly strong but quite edible. Humpback loins are not as strong as bovine bull, or reindeer, or sage hen, or northern grouse. At our house we've served it to company, spiced a bit maybe, and they never knew it. Europeans and Asiatics accept whale meat. Whale oil oleomargarine is also freely accepted there -- but not her, perish the thought! We worried the blubber, and the bone, and the viscera thru the fish reduction plant, but it wasn't easy.

Many things weren't easy about shaling. It wasn't easy to find enough whales to make an operation; it wasn't easy to get them ashore before they spoiled; it wasn't easy to cut them up; it wasn't easy to process whales with fish reduction equipment; it wasn't easy to find markets for the various items; it wasn't easy to assemble a capable crew on short spordic notice; it wasn't easy to ^{over}call off overtime; it wasn't easy to turn a profit on whales; today it wouldn't be easy to placate Greenpeace.

Whale have glamor. It was estimated that there were over a thousand spectators

present after some whales were landed. The morbid and the curious and the bored, and the horrified -- they were all there. Whales must have the greatest ability of all animals to incite a pun.

We had all manner of scientists come. One M.D. from Portland ran around with a No. 4 Bard Parker scalpel in his hand, quite perplexed as to how he would dissect samples off a 50 ton whale with it.

The friendless Tonquin was finally sold. The whale deck is used for storage when there's no place else to put something.

When I returned to Bioproducts in 1952, Dick had the Bioproducts Science Interest Award going. Bioproducts gave \$25 in May to the high school senior in the county who had evidenced the most interest in science. A Bioproduct's chemist, the County school superintendent (Emmet Towler), and one other science person (like a fish biologist), as a group, visited each of the high schools. We talked to about three of the students selected by their science teacher. A plaque was also given. I attended Class Night and made the award when I did it.

The monetary value of 25 bucks may ^{sound} like a small bag of groceries but I do believe it was effective. More than one high school told me that they liked it and hated to see it dropped. I guess it wouldn't have been dropped if I, too, had plugged it a little bit harder.

You see, ^a highschool students are expected to make career decisions that even middle-aged people often can't make. Thus it sometimes helps when a complete outside [✓] says, "John and Jane, you're both on the right track, run for it!"

Our educational system seems unable to cope with this problem adequately, and that may be the reason why they welcome a little friendly assist from beyond the realms of academic climes.

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Dick was not at the plant for a while in 1965. When he came back one day I asked him to step out in the plant and see what I had in a tank. He said very firmly, "Lyle, I'm not going out in the plant. I'm not supposed to be even here." He said he had phlebitis and showed me his bandaged leg that he had propped up on his desk. For a while he called me into his office every Friday afternoon and told me what he had scheduled to receive and ship. It was obviously a sensitive subject and I listened impassively. Then I was called.....

Not too long later John had an operation on his throat. I didn't know the details but they could be fancied. Very shortly after the operation, swelling set in and the stitches pulled out.....

Le Roi est mort. Vive le Roi!

Carnation wanted to buy for us, any materials that we did not produce. When they were shipped, I think that there was ^{neither} no way-bill nor invoice. Hillsboro accounted only to Wilshire Boulevard. Wilshire Boulevard off-set our acquisitions against our finished goods and sent an occasional balance account given in ledger code. It was difficult to follow and John had had to accept it on faith. Thru my weigh-in records, I could follow the receipts reasonably well. So I started maintaining the Carnation balance on typing paper. John wasn't happy about my loose bookkeeping but it was the best he had. Gradually I got all the Carnation accounting and the pellet production, with its ins and outs. If my bookkeeping was rudimentary, at least Hillsboro's was much worse.

I did little lab work now. I showed what in-process freezing would do to our pellet production with a simulated pilot plant-run using hands from the front office. If a picture is worth 1000 words, then participation is worth 1,000,000. George Helke drew up the engineering for this pellet change-over and did a most excellent job of it.

Now it was a whole new ball game and I wished to retire because of a disability.

We had had not only a slow turn-over in the crew, but even the front office people were different.

Dick's son, who had the same name, had joined the company about 1953 after college and some sort of a hitch in the navy. He had heard Bioproducts-talk nearly all of his life and he knew it from the ground up. With the vacancy that was created, he now fitted into the 'back' front office where nuisance visitors never reached. He was our president.

Some men are able to operate a pellet press so it makes good pellets but, surprisingly enough, most men can't. One man, Mike Murphy, seemed to have the grasp of the situation that enabled him to succeed in doing it from the start. When Harold Carrington, the long-time plant superintendant, died of a heart attack, Mike was moved to that job from fish pellet foreman. Then he rapidly progressed to Vice-President in Charge of Production, the position he holds today.

Jim Corkill was employed to assist John when John's health was poor. As John's condition progressed to termination, Jim had the capability and training to fill the vacancy to the company's advantage. He thus became Vice President of Marketing and Corporate Treasurer. The vigor of youth was apparent on all sides now.

I wasn't an officer in Bioproducts now but anyhow a vacancy would be created in the lab when I left. The question arose what direction Bioproducts' fortune would best be turned.

It could go to engineering but that seemed a dead-end street for a small company. It could go to fish culture but the huge capitalization made that a very risky choice in view of our poor water supply. The last and best choice was to expand in pet food because we already knew that we had the potential.

The matter was mulled over and we wished that we could find someone with the

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scope and ability of Don Morden (with whom we had collaborated for years while he was at Carnation). Then--was it chance?--Don asked if there was any opening at Bioproducts. He is Vice President in charge of Research.

Reduction is a memory. People ask in a concerned voice if the company isn't missing a bet. I tell them, "No, they aren't missing any bets. But they sure are winning some!"

MAJOR PRODUCTS OF BIOPRODUCTS

product	peak?	span	Demise
Salmon eggs	1935	1925-1938	Price cutting
Salmon meal	1936	1935-1940	Private production
Salmon canning oil	1937	1935-1950	Private products
Vitamin D/tuna livers	1938	1938-39	Synthetics
Vitamin A/ bottom fish livers	1945	1940-1960	Synthetics
Tuna oil	1951	1938-1978	Private production
Tuna meal	1952	1938-1978	Private production
Ortho Gro	1955	1950-1970	Price cutting and freight
Solubles	1958	1955-1978	Private production
Pellets	1972	1958- current	
Digest	1972	1958- current	

OTHER PRODUCTS OF BIOPRODUCTS

(not chronologically listed)

Shad oil and meal, BioGro, Bio Bloom, Bio Bone Meal, Vio Vita Aquarium Feed,
 Columbia Empire Fish Magazine, 5-9-9, 2-8-10, Bio pamin, Bio Moidin, various
 Bio Vita face cremes, Bio Vita Wheat Germ Oil, Vio Vita peppermint oil, Bio
 Vita Scotch Broom Wax, whale baleen, Spermacetti whale lamp oil, mink Ranchers
 phosphoric acid, Shee Leather/mink oil, Rat fish lubricant oil, Salmon Egg
 Japanese cavian base, Various pet food Ingediants, Crab shell soil conditioner,
 Bio Vita canned salmon, A and D Feeding Oil at several Potencies, 5-2-2,
 various tuna oil paints and tars, Oleum A, Oleum A Halves, Oleum A Quarters,
 Oleum A Halves water-Dispersible.